

REMARKS/ARGUMENTS

STATUS OF THE CLAIMS

Claims 1-5 and 14-16 are currently pending in this application. By this Amendment, claims 1-5 and 14-16 are amended and new claims 17-20 are added. Claims 6-13 were canceled in an earlier amendment.

CLAIM REJECTIONS – 35 U.S.C. §112

On pages 2-3 of the Office Action, Claims 1-5 and 14-16 are rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which the Applicant regards as the invention. Independent claims 1, 15, and 16 are hereby amended to clarify the subject matter which is claimed. The Applicant respectfully submits that the amendments hereby made to claims 1, 15, and 16 address the Examiner's indefiniteness rejections thereto. Withdrawal of the 35 U.S.C. §112, second paragraph rejections of claims 1-5 and 14-16 is therefore respectfully requested.

CLAIM REJECTIONS – 35 U.S.C. §103

As set forth in section 2143 of the MPEP, to establish a *prima facie* case of obviousness, the following three criteria must be met: 1) there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings, 2) there must be a reasonable expectation of success, and 3) the prior art reference (or combination thereof) must teach or suggest all the claim limitations.

On pages 3-4 of the Office Action, claims 1-5 and 14-16 are rejected under 35 U.S.C. §103(a) as being unpatentable over Stewart (U.S. Patent No. 4,337,825), in view of Kobayashi et al. (U.S. Patent No. 4,036,291).

Independent Claims

Claim 1 is hereby amended, and calls for:

A heat transfer device for removing heat energy from a plurality of electronic components separated from one another, the heat transfer device comprising:

a heat exchange structure containing a working fluid in a substantially closed envelope defining an evaporator and a condenser that are coupled by a vapor line and a liquid return line to provide a circulating path for the working fluid, through vaporization of a liquid phase of the working fluid at the evaporator, condensation of a vapor phase of the working fluid at the condenser, and return of the working fluid from the condenser to the evaporator through said liquid return line;

wherein the evaporator comprises a bottom wall having a first portion at least partially defining a reservoir, and second and third portions elevated with respect to the first portion and each at least partially defining a respective evaporation chamber adjacent the reservoir, the reservoir in flow communication with the liquid return line and positioned below a turret that defines a vapor accumulator arranged in flow communication with said vapor line, the evaporation chambers separated by the reservoir, each of the second and third portions of the wall positioned for application of heat energy from distinct ones of the electronic components, and said two evaporation chambers commonly supplied with the liquid phase of the working fluid from the reservoir that is below said vapor accumulator.

(Amendment marks not shown)

Claim 15 is hereby amended, and calls for:

A heat transfer device for removing heat energy from a plurality of electronic components separated from one another, the heat transfer device comprising:

a heat exchange structure containing a working fluid in a substantially closed envelope defining an evaporator including a vapor accumulator in flow communication with a vapor line, a condenser coupled to said evaporator by said vapor line, and a liquid return line to provide a circulating path for the working fluid, through vaporization of a liquid phase of the working fluid at the evaporator, condensation of a vapor phase of the working fluid at the condenser, and return of the working fluid from the condenser to the evaporator through said liquid return line;

wherein the evaporator comprises a bottom wall having a first portion at least partially defining a reservoir, and second and third portions elevated with respect to the first portion and each at least partially defining a respective evaporation chamber adjacent the reservoir, the reservoir in flow communication with the liquid return line, the two evaporation chambers separated by the reservoir, each of the second and third portions of the wall positioned for application of heat energy from distinct ones of the electronic components and commonly supplied with the liquid phase of the working fluid from the reservoir.
(Amendment marks not shown)

Claim 16 is hereby amended, and calls for:

A heat transfer device for removing heat energy from a plurality of electronic components separated from one another, the heat transfer device comprising:

a heat exchange structure containing a working fluid in a substantially closed envelope defining (i) an evaporator including a turret that defines a vapor accumulator arranged in flow communication with a vapor line, and (ii) a condenser that is coupled to said evaporator by said vapor line and said liquid return line so as to provide a circulating path for the working fluid, through vaporization of a liquid phase of the working fluid at the evaporator, condensation of a vapor phase of the working fluid at the condenser, and return of the working fluid from the condenser to the evaporator through said liquid return line;

wherein the evaporator comprises a bottom wall having a first portion at least partially defining a reservoir, and second and third portions elevated with respect to the first portion and each at least partially defining a respective evaporation chamber adjacent the reservoir, the reservoir in flow communication with the liquid return line, the evaporation chambers separated by the reservoir, each of the second and third portions of the wall positioned for application of heat energy from distinct ones of the electronic components, said two evaporation chambers commonly supplied with the liquid phase of the working fluid from the reservoir.

(Amendment marks not shown)

In contrast, Stewart discloses a duct 10 for transferring heat from air to water utilizing an array of heat pipes in relation with a manifold, whereas Kobayashi et al. disclose the use of two vapor cooling containers to cool a semiconductor device. The Applicant respectfully submits that the Stewart duct is not adapted or adaptable to remove heat from a plurality of electronic components as claimed in amended claims 1, 15, and 16, and that the teachings of Kobayashi et

al. fail to cure the deficiencies of Stewart in this regard. The Stewart duct 10 utilizes a number of finned heat tubes D for cooling passing air, rather than electronic components. Neither Stewart nor Kobayashi et al. provide any suggestion or motivation to modify the Stewart duct 10 so that it is used to cool electronic components. Furthermore, Stewart and Kobayashi et al. both fail to provide any indication regarding how any of the disclosed devices could be adapted for cooling electronic components as claimed in claims 1, 15, or 16, how the electronic components would be positioned relative to any evaporation chambers as claimed in amended claims 1, 15, and 16, or why or how any of the disclosed devices could be modified to define different elevated bottom wall portions of an evaporator (whether for the application of heat energy from distinct electronic components or otherwise).

For example, there is no suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify Stewart's air to water heat exchange apparatus to cool electric devices as taught by Kobayashi et al., nor does either reference suggest how such modifications could be made or the resulting structural shape of the evaporator as claimed in claims 1, 15, and 16.

Furthermore, there is no combination of the elements of Stewart and Kobayashi et al. that includes all the elements of claims 1, 15, and 16. Therefore, there could be no expectation of successfully combining the references to produce the claimed invention.

Clearly, neither Stewart, nor Kobayashi et al., nor any combination of the two teach, describe, or suggest, among other things, a heat transfer device comprising an evaporator and a condenser that are coupled by a vapor line and a liquid return line, wherein the evaporator comprises a bottom wall having a first portion at least partially defining a reservoir, and second and third portions elevated with respect to the first portion and each at least partially defining a respective evaporation chamber adjacent the reservoir, each of the second and third portions of the wall positioned for application of heat energy from distinct ones of the electronic components, as claimed in amended claims 1, 15, and 16.

Dependent Claims

Claims 2-5 and 14 each ultimately depend from amended claim 1, and are therefore allowable based on amended claim 1 and upon other features and elements of claims 2-5 and 14 not specifically discussed herein.

In light of these and other reasons not discussed herein, the Applicant respectfully submits that independent claims 1-5 and 14-16 are novel and patentable over Stewart and Kobayashi et al. Accordingly, withdrawal of the 35 U.S.C. §103(a) rejection of claims 1-5 and 14-16 in view of Stewart and Kobayashi et al. is respectfully requested.

On pages 3 and 4-5 of the Office Action, claims 1-5 and 14-16 are rejected under 35 U.S.C. §103(a) as being unpatentable over the combined teachings of Kobayashi et al. (U.S. Patent No. 5,998,863), and at least one of Yamamoto et al. (U.S. Patent No. 6,269,866) and Hisano et al. (U.S. Patent No. 5,198,889).

Independent Claims

In contrast to the present invention as claimed in amended claims 1, 15, and 16, Kobayashi et al. disclose a cooling apparatus with one end of a radiator in communication with a central portion of a refrigerant tank and an opposite end in communication with a peripheral edge portion of the refrigerant tank, wherein the refrigerant tank is a flat tubular member with caps fitted on opposite end portions to close the tubular member. (Col. 5, lines 61-62; Col. 6, lines 26-28). Yamamoto et al. fail to cure the deficiencies of Kobayashi et al., and is cited only for the purpose of teaching the use of a heat pipe to cool multiple devices of different heights. Similarly, the Hisano et al. reference also fails to cure the deficiencies of Kobayashi et al., and is cited only for the purpose of teaching an apparatus capable of cooling multiple heat generating members. Furthermore, there is no combination of the elements of Kobayashi et al., Yamamoto et al., and Hisano et al. that includes all the elements of amended claims 1, 15, and 16. Therefore, the Applicant respectfully submits that there could be no expectation of successfully combining the references to produce the claimed invention.

Clearly, neither Kobayashi et al., nor Yamamoto et al., nor Hisano et al., nor any combination of the these references teach, describe, or suggest, among other things, a heat transfer device comprising an evaporator and a condenser that are coupled by a vapor line and a liquid return line, wherein the evaporator comprises a bottom wall having a first portion at least partially defining a reservoir, and second and third portions elevated with respect to the first portion and each at least partially defining a respective evaporation chamber adjacent the reservoir, the reservoir in flow communication with the liquid return line, the two evaporation chambers separated by the reservoir, each of the second and third portions of the wall positioned for application of heat energy from distinct ones of the electronic components, as claimed in amended claims 1, 15, and 16.

Dependent Claims

As previously stated, claims 2-5 and 14 each ultimately depend from independent claim 1, and are therefore allowable based on amended claim 1 and upon other features and elements of claims 2-5 and 14 not specifically discussed herein.

In light of these and other reasons not discussed herein, the Applicants respectfully submit that independent claims 1-5 and 14-16 are novel and patentable over Kobayashi et al., Yamamoto et al., and Hisano et al. Accordingly, withdrawal of the 35 U.S.C. §103(a) rejection of claims 1-5 and 14-16 in view of Kobayashi et al. and Yamamoto or Hisano is respectfully requested.

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CONCLUSION

In view of the above, the Applicants respectfully request entry of the present Amendment and allowance of pending Claims 1-5 and 14-20.

Respectfully submitted,



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